IN THE CLAIMS:

Please ADD new claims 40 and 41, as follows. For the Examiner's convenience, all claims currently pending in this application have been reproduced below:

1-17. (Cancelled)

18. (Previously Presented) An illumination optical system for illuminating a surface, to be illuminated, with use of light from a light source, said illumination optical system comprising:

a diffractive optical element for forming a desired light intensity distribution upon a predetermined plane;

an angular distribution transforming unit for transforming an angular distribution of light incident or to be incident on said diffractive optical element into a plurality of predetermined distributions;

a multiple beam producing unit, wherein the predetermined plane is a light entrance surface of said multiple beam producing unit; and

a light projecting element for superposing light rays from said multiple beam producing unit one upon another on the surface to be illuminated.

19. (Previously Presented) An illumination optical system according to Claim 18, further comprising a blocking member for blocking zero-th order diffraction light produced by said diffractive optical element.

20. (Previously Presented) An illumination optical system according to Claim 18, further comprising a blocking member for blocking zero-th order diffraction light produced by said diffractive optical element, wherein said blocking member is disposed one of (i) at or adjacent to the light entrance surface of said multiple beam producing unit, (ii) at or adjacent to the light exit surface of said multiple beam producing unit, and (iii) at a position optically conjugate with the same.

21. (Previously Presented) An illumination optical system according to Claim 18, wherein said diffractive optical element is disposed at a Fourier transform plane with respect to the light entrance surface of said multiple beam producing unit.

22. (Previously Presented) An illumination optical system according to Claim 18, further comprising an optical element disposed between said diffractive optical element and said multiple beam producing unit, said optical element being movable along an optical axis direction.

23. (Previously Presented) An illumination optical system according to Claim 18, further comprising an internal reflection member effective to make uniform the light intensity distribution of the light incident on the light entrance surface thereof, wherein the light exit surface of said internal reflection member is disposed at a position optically conjugate with the light entrance surface of said multiple beam producing unit.

24. (Previously Presented) An illumination optical system according to Claim 18, wherein said diffractive optical element is demountably inserted into an optical path.

25. (Previously Presented) An illumination optical system according to Claim 18, wherein said blocking member is demountably inserted into an optical path.

26. (Previously Presented) An illumination optical system for illuminating a surface, to be illuminated, with use of light from a light source, said illumination optical system comprising:

a diffractive optical element for forming a desired light intensity distribution upon a predetermined plane;

an angular distribution transforming unit for transforming an angular distribution of light incident or to be incident on said diffractive optical element into a desired distribution, and

an internal reflection member effective to make uniform the light intensity distribution of the light incident on the light entrance surface thereof, wherein the light entrance surface of said internal reflection member and the diffractive optical element are optically conjugate with each other, light from said diffractive optical element is incident on the light entrance surface of said internal reflection member, and the surface to be illuminated is illuminated with light from said internal reflection member.

27. (Cancelled)

28. (Cancelled)

29. (Previously Presented) An exposure apparatus comprising:

an illumination optical system for illuminating a mask, to be illuminated, with use of light from a light source, said illumination optical system including (i) a diffractive optical element for forming a desired light intensity distribution upon a predetermined plane, (ii) an angular distribution transforming unit for transforming an angular distribution of light incident or to be incident on said diffractive optical element into a plurality of predetermined distributions, (iii) a multiple beam producing unit, wherein the predetermined plane is a light entrance surface of said multiple beam producing unit, and (iv) a light projecting element for superposing light rays from said multiple beam producing unit upon one another on the surface to be illuminated; and

a projection optical system for projecting a pattern of the mask, illuminated with light from said illumination optical system, onto a wafer.

30. (Previously Presented) A device manufacturing method, comprising the steps of:

applying a photosensitive material onto a wafer;

illuminating a mask surface, to be illuminated, by use of light from an illumination optical system, said illumination optical system including (i) a diffractive optical element for forming a desired light intensity distribution upon a predetermined plane, (ii) an angular distribution transforming unit for transforming an angular distribution of light incident or

to be incident on said diffractive optical element into a plurality of predetermined distributions, (iii) a multiple beam producing unit, wherein the predetermined plane is a light entrance surface of said multiple beam producing unit, and (iv) a light projecting element for superposing light rays from said multiple beam producing unit upon one another on the surface to be illuminated;

transferring, by use of a projection optical system, a pattern of the mask onto a wafer; and

developing the transferred pattern.

31. (Previously Presented) A projection exposure apparatus comprising:

an illumination optical system for illuminating a mask, to be illuminated, with use of light from a light source, said illumination optical system including (i) a diffractive optical element for forming a desired light intensity distribution upon a predetermined plane, (ii) an angular distribution transforming unit for transforming an angular distribution of light incident or to be incident on said diffractive optical element into a desired distribution, and (iii) an internal reflection member effective to make uniform the light intensity distribution of the light incident on the light entrance surface thereof, wherein the light entrance surface of said internal reflection member and the diffractive optical element are optically conjugate with each other, light from said diffractive optical element is incident on the light entrance surface of said internal reflection member, and the surface to be illuminated is illuminated with light from said internal reflection member; and

a projection optical system for projecting a pattern of the mask illuminated with light from said illumination optical system, onto a wafer.

32. (Cancelled)

33. (Cancelled)

34. (Previously Presented) A device manufacturing method comprising the steps of:

applying a photosensitive material onto a wafer;

illuminating a mask surface, to be illuminated, by use of light from an illumination system, said illumination optical system including (i) a diffractive optical element for forming a desired light intensity distribution upon a predetermined plane, (ii) an angular distribution transforming unit for transforming an angular distribution of light incident or to be incident on said diffractive optical element into a desired distribution, and (iii) an internal reflection member effective to make uniform the light intensity distribution of the light incident on the light entrance surface thereof, wherein the light entrance surface of said internal reflection member and the diffractive optical element are optically conjugate with each other, light from said diffractive optical element is incident on the light entrance surface of said internal reflection member, and the surface to be illuminated is illuminated with light from said internal reflection member;

transferring, by use of a projection optical system, a pattern of the mask onto a wafer; and

developing the transferred pattern.

35. (Cancelled)

36. (Cancelled)

37. (Previously Presented) An illumination optical system according to Claim 18, wherein said angular distribution transforming unit includes an optical element movable along an optical axis direction, wherein, with the movement of said optical element, the angular distribution of light incident on the diffractive optical element is changed.

38. (Previously Presented) An illumination optical system according to Claim 18, wherein said angular distribution transforming unit includes a plurality of optical elements demountably inserted into an optical path, wherein, with the selection of an optical element among said plurality of optical elements, to be present on the optical path, the angular distribution of light incident on the diffractive optical element is changed.

39. (Previously Presented) An illumination optical system according to Claim 26, wherein said angular distribution transforming unit transforms the angular distribution into a plurality of predetermined distributions.

40. (New) An illumination optical system according to Claim 39, wherein said angular distribution transforming unit includes an optical element movable along an optical axis direction, and the angular distribution of light incident on the diffractive optical element is changed in accordance with the movement of said optical element.

41. (New) An illumination optical system according to Claim 39, wherein said angular distribution transforming unit includes a plurality of optical elements selectively and demountably placed on an optical path, and the angular distribution of light incident on the diffractive optical element is changed in accordance with selection of an optical element of said plurality of optical elements to be presented on the optical path.